**Division Data Summary**

<table>
<thead>
<tr>
<th>Research and Training Details</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Faculty</td>
<td>15</td>
</tr>
<tr>
<td>Number of Joint Appointment Faculty</td>
<td>2</td>
</tr>
<tr>
<td>Number of Research Fellows</td>
<td>9</td>
</tr>
<tr>
<td>Number of Research Students</td>
<td>6</td>
</tr>
<tr>
<td>Number of Support Personnel</td>
<td>20</td>
</tr>
<tr>
<td>Direct Annual Grant Support</td>
<td>$1,034,623</td>
</tr>
<tr>
<td>Peer Reviewed Publications</td>
<td>28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical Activities and Training</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Clinical Staff</td>
<td>17</td>
</tr>
<tr>
<td>Number of Clinical Fellows</td>
<td>1</td>
</tr>
<tr>
<td>Number of Clinical Students</td>
<td>12</td>
</tr>
<tr>
<td>Number of Other Students</td>
<td>2</td>
</tr>
<tr>
<td>Inpatient Encounters</td>
<td>2,998</td>
</tr>
<tr>
<td>Outpatient Encounters</td>
<td>22,948</td>
</tr>
</tbody>
</table>

**Significant Publications**


This work uncovered novel mechanisms by which immune cells regulate blood vessel development. As a result, we have found pathways that could be exploited in treating diseases with a vascular component.


This is the initial study linking polymorphic SNP nucleotide changes within an essential gene enhancer of the human ATOH7 gene to heritable differences in optic disc size. There are now four other publications further associating this SNP with susceptibility for developing open angle glaucoma.


Notch and Ras signaling are associated with a wide range of developmental processes, and are highly linked to a multitude of diseases and cancers. Moreover, these pathways frequently cross-regulate each other. However, how these pathways function in different tissue and organ types to mediate distinct functions is unclear. The work described in Charlton-Perkins et al. in Neural Development show that two downstream targets of Ras and Notch, the transcription factors Prospero and dPax2, feedback to modulate the output of...
the signaling pathways. Moreover, it reveals that, in response to Ras and Notch signaling, Pros and dPax2 function antagonistically to control neuronal vs non-neuronal cell fates but function synergistically to control lens formation during Drosophila eye development. Pros and Pax2-related molecules are important for lymphangiogenesis, liver, lens, kidney, and ear development, and cancer in vertebrate systems, so these studies provide insight into how Ras and Notch signaling may integrate with these factors in many biological contexts.


This paper describes the identification of first Methionine Sulfoxide Reductase mutations causing isolated hearing loss in humans. This identification provides new insights about the function and the role of oxidative stress on the physiology of inner ear.

Division Highlights

Zubair Ahmed, PhD

Zubair Ahmed’s lab continued to investigate the molecular and genetic basis of Usher syndrome and oculocutaneous albinism (OCA), utilizing human, mouse and zebrafish genetics. His lab significantly contributed in the identification of two new deafness genes, MSRB3 and ILDR1. In addition his lab has recently initiated a joint venture with an institute in Pakistan to discover the new genes responsible for OCA phenotype. To decipher the genetic lesions and genotype-phenotype correlation in subjects suffering with Blue Cone monochromatism, Dr. Ahmed in collaboration with Dr. Robert Sisk enrolled three large kindreds from Cincinnati-Kentucky area. In the past year, work from Dr. Ahmed’s lab was at the annual meeting of the Association for Research in Otolaryngology (ARO), annual meeting of The Association for Research in Vision and Ophthalmology (ARVO) and at the 16th Annual Ophthalmology Conference & Research symposium organized by Department of Ophthalmology, University of Cincinnati.

Marie Bodack, OD

Dr. Bodack is working on a research project with the clinical characteristics of children under the age of 13 with exotropia or esotropia. The research will look at the magnitude of the deviation, associated ocular and systemic diagnoses, the presence of amblyopia and stereopsis, etc.

Nadean Brown, PhD

Dr. Brown’s research focuses on the critical roles of the Notch signaling pathway during prenatal lens formation. A second project in the lab aims to understand the regulation and functions of bHLH transcription factors and Notch signaling during retinal ganglion cell and cone photoreceptor differentiation. Dr. Brown gave research presentations at the University of Utah; University of Missouri; University of California, Davis; West Virginia Univ Med School; and University of Michigan; 2010 International Conference on Eye Research in Montreal; 2011 annual meeting of the Association for Research in Otolaryngology Meeting in Baltimore; and 2011 Keystone Symposium on Evolution and Development in Lake Tahoe. Dr. Brown was an invited guest lecturer in a Developmental Genetics graduate course at the University of Missouri. Graduate student Kate Maurer has been awarded a Prevent Blindness Ohio Summer Fellowship.

Tiffany Cook, PhD
Dr. Cook’s research continues to explore evolutionarily conserved processes underlying retina and lens formation. Her group has made important advances in understanding into how the decision to become neuronal (retina) vs. non-neuronal (lens) is made during development. In addition, Dr. Cook’s retina research has provided mechanistic insight into how the various light-sensing photoreceptor cells are generated and maintained. This work has implications for developing better diagnostic and therapeutic tools for retinal degenerative diseases. Last year, Dr. Cook presented her work at SUNY Downstate and Indiana University (IUPUI), and was invited to review the most up-to-date findings in the fields of eye development for Current Topics in Developmental Biology and Progress in Molecular Biology and Translational Sciences.

Fumika Hamada, PhD

Dr. Hamada’s laboratory studies circadian rhythm of body temperature (body temperature rhythm). Body temperature rhythm is critical for the maintenance of homeostasis functions, such as metabolic energy generation and sleep. Her lab progress has been remarkable as their work reveals the hitherto unknown molecular mechanisms underlying body temperature rhythm and has led to the first identification of a molecule that links circadian clock to body temperature rhythm. Dr. Hamada has presented her work at the International Symposium of Life Sciences at Fukuoka University in Fukuoka, Japan and the Gordon Research Conference on Chronobiology in Barga, Italy.

Richard Lang, PhD

Dr. Lang’s laboratory continued making significant scientific contributions during FY2011. His lab has made important advances in our understanding of epithelial morphogenesis mechanisms and has shown that the small GTPases RhoA and Rac1 control the shape of cells and thus epithelial curvature during lens formation. Dr. Lang has also shown that during development of the retina, microglia, a type of immune cell, regulate the formation of blood vessels branches and ultimately determine the density of the blood vessel network. This has important implications for understanding the many diseases in which immune cells play a role. In this past year, Dr. Lang has presented his work at New York University, the University of Illinois at Chicago, The Medical College of Wisconsin and the University of Kentucky. Internationally, he presented at Frontiers in Sensory Development Conference in Barcelona, Spain, the International Society for Eye Research in Montreal, Canada. He also participated in the Cincinnati Children’s Israel Exchange Program in Tel Aviv, Israel.

Sarah Lopper, OD

Dr. Lopper has developed a reliable pathway to ensure regular ophthalmic screenings for children at risk for ophthalmic manifestations of systemic diseases such as juvenile idiopathic arthritis. This has improved the outcomes for children with juvenile idiopathic arthritis. She completed a 6 month course learning the techniques of Quality Improvement in Healthcare and is currently working on developing a model to improve the show rate for ophthalmology patients. This initiative has the potential to improve access for the division and expand the reach to patients. The history of no shows impacts the clinic in several ways: (1) underutilization of resources, (2) patients are not seen in a timely manner, (3) patients cannot be followed for an urgent diagnosis. The division anticipates a reduction of the no show rate with various intervention strategies.

W. Walker Motley, MD

Dr. Motley is interested in eye issues associated with Down syndrome. Dr. Motley and co-author Dr. Saltarelli recently had a manuscript on Ophthalmic Manifestations of Mosaic Down Syndrome accepted for publication in the Journal of the American Association for Pediatric Ophthalmology and Strabismus (AAPOS). Dr. Motley
and colleagues have submitted another manuscript on strabismus surgery outcomes in individuals with Down syndrome. This work was presented at the AAPOS national meeting in April of 2011 and won the award for best presentation at the University of Cincinnati Department of Ophthalmology research symposium. Dr. Motley is currently working on methods of improvement in resident and fellow education and training in the areas of strabismus surgery and laser surgery for retinopathy of prematurity. Dr. Motley won this year's University of Cincinnati Department of Ophthalmology Academic Faculty Teacher of the Year Award in June 2011.

**Saima Riazuddin, PhD**

Riazuddin’s lab continued to investigate the molecular and genetic basis of hearing loss, utilizing human and mouse genetics. Her lab recently identified the *MSRB3* gene that is responsible for autosomal recessively inherited deafness (DFNB74) in eight Pakistani families. Using the genetic, molecular biological and cell biology techniques her lab is currently characterizing the molecular mechanisms of auditory dysfunction resulting from mutation in *MSRB3* gene. In addition her lab has recently discovered a new locus for recessively inherited deafness (DFNB86) in another Pakistani family. In the past year, Dr. Riazuddin presented her work at the annual meeting of the Association for Research in Otolaryngology. Dr. Riazuddin’s research is expected to stimulate the next critical step of clinical improvements in the treatment and prevention of hearing loss.

**Dan Saltarelli, OD**

Dr. Saltarelli is a provider of optometric services within the division. He has developed a special interest in the area of pediatric contact lenses, and continues to pursue advances in this field. His current interests revolve around pediatric aphakia and the development of an infant aphakia database with the eventual goal of improving the visual outcome for this special population of children.

**Michael B. Yang, MD**

Dr. Yang has continued his research on retinopathy of prematurity. Through his involvement, the department of ophthalmology has been invited to participate in upcoming multicenter trials (currently in submission or planning stages) on analyzing weekly weight gain in premature infants as a predictor of ROP outcome and on the use of Avastin to treat severe treatment warranting ROP. We anticipate one or possibly both of these trials to be funded. Dr. Yang also collaborated with researchers in the Winkle College of Pharmacy to demonstrate high local concentrations of propranolol after topical instillation of the drug as compared with systemic intravenous or oral administration of propranolol. This may influence how infants with periocular capillary hemangiomas are treated in the future. A research paper has been accepted for publication and two grant proposals have been submitted for consideration of funding based on this research.

**Constance E. West, MD**

Dr. West the Director of the Division of Pediatric Ophthalmology and the Abrahamson Pediatric Eye Institute, has a special interest in ophthalmic optics, and teaches nationally and internationally. She travels yearly to Mexico City to help teach at a large eye hospital, and also to the Curso Basico, a program for ophthalmology residents from Central and South America. She just finished a three-year term as Secretary-Treasurer of the American Association for Pediatric Ophthalmology and Strabismus (AAPOS). She has a special interest in the documentation of eye findings in child abuse.
Developmental Biology » James Wells, PhD
  Wntles in pancreas development with Richard Lang, PhD

Developmental Biology » Aaron Zorn, PhD; Rashmi Hegde, PhD; Matthew Kofron, PhD
  CRIM1 function with Richard Lang, PhD

Developmental Biology » Yutaka Yoshida, PhD
  Wntless in neurogenesis with Richard Lang, PhD

Developmental Biology » Geraldine Guasch, PhD
  Sox2 and Wnt in transitional zone formation with Richard Lang, PhD

Developmental Biology » Yi Zheng, PhD
  GTPase function in morphogenesis with Richard Lang, PhD

Developmental Biology » Xinhua Lin, PhD
  Wntless function with Richard Lang, PhD

Gastroenterology » Noah Shroyer, PhD
  Wnts in gut regeneration with Richard Lang, PhD

Immunobiology » Marsha Wills-Karp, PhD
  Micoglial function in vascular patterning with Richard Lang, PhD

Developmental Biology » Brian Gebelein, PhD
  Molecular control of Drosophila nervous system development with Tiffany Cook, PhD

Molecular Cardiology » Katherine Yutzey, PhD
  Notch signaling in early lens, heart & liver development with Nadean Brown, PhD

Developmental Biology » Xinhua Lin, PhD
  Novel BTB domain protein in Drosophila morphogenetic cell with Nadean Brown, PhD

Developmental Biology » James Wells, PhD; Christopher Mayhew, PhD
  Differentiation of hPSCs into lentoid bodies with Nadean Brown, PhD

Audiology » David Brown, PhD
  Universal newborn hearing screen with Saima Riazuddin, PhD

Developmental Biology » Saulius Sumanas, PhD
  Analysis of DFNB26 mutation using Zebrafish as a model system with Saima Riazuddin, PhD & Zubair Ahmed, PhD

Developmental Biology » Rashmi Hegde, PhD
  Molecular modeling of USH1 protein to identify the affect on the structure with Zubair Ahmed, PhD

Faculty Members

Constance E. West, MD, Associate Professor
  Division Director
  Research Interests

James J. Augsburger, MD, FACS, Professor
  Chairperson, Department of Ophthalmology
  Research Interests

Richard A. Lang, PhD, Professor
  Emma & Irving Goldman Scholar
Head, Visual Systems Group

Research Interests

Zubair Ahmed, PhD, Assistant Professor

Research Interests

Marie I. Bodack, OD, FAAO, FCOVD, Instructor

Research Interests

Dean J. Bonsall, MD, MS, FACS, Associate Professor

Research Interests

Tiffany Cook, PhD, Assistant Professor

Research Interests

Fumika Hamada, PhD, Assistant Professor

Research Interests

Adam H. Kaufman, MD, FACS, Associate Professor

Research Interests

Sarah Lopper, OD, Instructor

Research Interests

William Walker Motley, MD, MS, Assistant Professor

Research Interests

Daniele Saltarelli, OD, Instructor

Research Interests

Terry Schwartz, MD, Assistant Professor

Research Interests

Robert Sisk, MD, Assistant Professor

Research Interests

Michael B. Yang, MD, Associate Professor

Research Interests

Joint Appointment Faculty Members

Nadean Brown, PhD, Associate Professor

Department of Developmental Biology

Saima Riazuddin, PhD, Assistant Professor

Department of Otolaryngology

Clinical Staff Members

- Laurie Hahn-Parrott, CO, COT, MBA
- Corey Bowman, COT, LDO, ABOC
- Brandy Dearwater, COA
- Adrienne Distler, COA
- Jennifer Duncan, COA
- Lisa Fite, COA
- Ashley Jackson, COA
- Debbie Lipps, COA
- Patty Lucas, COA
- Melody Klayer,
- Judy Masters, COT
- Nicole McLeod, COA
- Debbie Meister, COA
- Jill Simmons, COA
- Kelli Vieson, COT

Trainees

- Melanie Bradley, MD, PGY5, Ophthalmology Resident, University of Kentucky-Lexington
- Katie Bezold, BS, Graduate Student, Xavier University, Cincinnati, OH
- Yuqi Cai, PhD, Research Fellow, Zhejiang University, China
- Manpreet Chhabra, MD, PGY4, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- Ian Conner, MD, PGY4, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- April Carpenter-Elrod, PhD, Research Fellow, Hospital for Special Surgery, New York, NY
- Mark Charlton-Perkins, BS, Graduate Student, University of Otago, Dunedin, New Zealand
- Bhareesh Chauhan, PhD, Research Associate, Oxford University, Oxford England
- Jieqing Fan, BS, Graduate Student, Tsinghua University, Beijing, China
- Arnaud Giese, PhD, Research Fellow, Universite Victor Segalen, Bordeaux, France
- Michael Gray, MD, PGY4, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- Mary "Meg" Grulee, MD, PGY2, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- Hena Khaja, MD, PGY2, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- Haruna Kaneko, PhD, Research Fellow, Tokyo Medical and Dental University, Japan
- Ailee Laham, MD, PGY2, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- Shawn Lewis, MD, PGY2, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- Manna Li, PhD, Research Fellow, Peking University Health Science Center, Beijing, China
- Amina Malik, MD, PGY3, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- Kate Maurer, BS, Graduate Student, Susquehanna University, Selinsgrove, PA
- Elizabeth McDonald, BA, Graduate Student, Hartwick College, Oneonta, NY
- Mitul Mehta, MD, PGY3, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- Myungsoon Moon, PhD, Research Fellow, University of Wisconsin, Madison, WI
- Gowri Nayak, PhD, Research Fellow, University of Sussex, Brighton, United Kingdom
- Jamey Osher, MD, PGY3, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- Timothy Plageman, PhD, Research Fellow, University of Cincinnati, Cincinnati, OH
- Virgilio Ponferrada, PhD, Research Associate, Wright State University, Dayton, OH
- Sujata Rao, PhD, Research Associate, Cornell University, Ithaca, New York
- Tomohito Sato, MD, Visiting Research Scientist, National Medical College, Japan
- Scott Schoenberger, MD, PGY4, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- Adeel Shaikh, MD, PGY3, Ophthalmology Resident, University of Cincinnati, Cincinnati, OH
- James A. Stefater, BS, Graduate Student, Centre College, Danville, KY
- David Terrell, BS, Graduate Student, Texas State University - San Marcos, San Marcos, TX
- Baotong Xie, PhD, Research Fellow, Chinese Academy of Sciences, Beijing, China
- Eun-Jin Yeo, PhD, Research Fellow, Seoul National University, Seoul, South Korea
- Rizwan Yousaf, MS, Graduate Student, Center for Excellence in Molecular Biology, Pakistan
Significant Accomplishments

Abrahamson Pediatric Eye Institute

The Division of Pediatric Ophthalmology continues to research ways to improve clinical outcomes. Michael Yang, MD, has one active study that will be internally funded by the Department of Pediatric Ophthalmology. “Retinopathy of Prematurity (ROP) in Older and Heavier Premature Infants” will retrospectively study the efficacy of the 2006 national ROP screening criteria for premature infants at risk for development of this potentially blinding ocular disease by determining how many of a recently included small subset of heavier and older premature infants actually developed ROP warranting surgical treatment. ROP is caused by overgrowth of capillaries in the eye which can lead to scarring and eventual detachment of the retina if left untreated in its early stages. The hypothesis is that very few from this subset of infants develop severe ROP or require ROP surgery, and that they may not require screening exams at all. The objective is to decrease the number of screening exams performed on infants, reducing the time and cost expended by both physicians and patient families, thus enhancing quality of care.

Visual Systems Group

The Visual Systems Group of Pediatric Ophthalmology is dedicated to providing the most cutting-edge research initiative at Cincinnati Children’s. Our mission is to exclusively work on the development and disease processes and make every effort to understand how these diseases affect the visual system. With recruitment completed, we expect to see an increase in the overall research contribution of our group. We are excited and continue to have great expectations about the future of the Visual Systems Group and the significant contributions that each individual will make. We believe our results will open doors and opportunities for research endeavors for years to come.

Division Publications


24. Sisk RA, Berrocal AM, Albini TA, Murray TG. Bevacizumab for the treatment of pediatric retinal and


Grants, Contracts, and Industry Agreements

<table>
<thead>
<tr>
<th>Grant and Contract Awards</th>
<th>Annual Direct / Project Period Direct</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AHMED, Z</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Molecular Genetics of Usher Syndrome Type I</strong></td>
<td></td>
</tr>
<tr>
<td>National Institutes of Health</td>
<td></td>
</tr>
<tr>
<td>R00 DC 009287</td>
<td>08/01/09-07/31/12</td>
</tr>
<tr>
<td><strong>RPB Career Development Award</strong></td>
<td></td>
</tr>
<tr>
<td>Research to Prevent Blindness(University of Cincinnati)</td>
<td></td>
</tr>
<tr>
<td>07/01/10-06/30/14</td>
<td></td>
</tr>
<tr>
<td><strong>COOK, T</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Pros/Prox1 and Lens Development in Drosophila</strong></td>
<td></td>
</tr>
<tr>
<td>National Institutes of Health</td>
<td></td>
</tr>
<tr>
<td>R01 EY 017907</td>
<td>09/15/07-07/31/12</td>
</tr>
<tr>
<td><strong>LANG, R</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Macrophages and Tumor Angiogenesis</strong></td>
<td></td>
</tr>
<tr>
<td>National Institutes of Health(Albert Einstein College of Medicine)</td>
<td></td>
</tr>
<tr>
<td>R01 CA 131270</td>
<td>12/01/07-11/30/12</td>
</tr>
<tr>
<td><strong>RhoGTPases in Early Eye Development</strong></td>
<td></td>
</tr>
<tr>
<td>National Institutes of Health</td>
<td></td>
</tr>
<tr>
<td>R01 EY 017848</td>
<td>04/06/07-03/31/12</td>
</tr>
<tr>
<td><strong>Targeting Survival Factors for Ocular NV</strong></td>
<td></td>
</tr>
<tr>
<td>National Institutes of Health(The Johns Hopkins University)</td>
<td></td>
</tr>
<tr>
<td>R01 EY 012609</td>
<td>04/01/08-03/31/12</td>
</tr>
<tr>
<td><strong>Wnt Pathway Regulation of Lens Polarity</strong></td>
<td></td>
</tr>
<tr>
<td>National Institutes of Health</td>
<td></td>
</tr>
<tr>
<td>R01 EY 016241</td>
<td>03/01/11-02/28/15</td>
</tr>
<tr>
<td><strong>The Roles of Sox2 in Lens and Retinal Development</strong></td>
<td></td>
</tr>
<tr>
<td>US-Israel Binational Science Foundation</td>
<td></td>
</tr>
<tr>
<td>02/01/09-01/31/13</td>
<td></td>
</tr>
<tr>
<td><strong>XIE, B</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Investigating the Mechanisms of Basic Leucine Zipper Factor Traffic Jam Regulating Photoreceptor Cell Subtype Fate Decisions in Drosophila Eye</strong></td>
<td></td>
</tr>
<tr>
<td>University of Cincinnati</td>
<td></td>
</tr>
<tr>
<td>01/01/11-12/31/11</td>
<td></td>
</tr>
<tr>
<td><strong>WEST, C.</strong></td>
<td></td>
</tr>
<tr>
<td>Current Year Direct</td>
<td>$1,034,623</td>
</tr>
</tbody>
</table>